SCIENTIAE
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#BeMoreOcean

SCIENTIAE MARE FURUM

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This publication is accompanied by six online episodes, in French, available here.

To all curious minds,
Keep discovering and share your wonders.

Note to the reader

This journal was submitted to the University by a merchant, along with a rather unsettling note. Deeming its content relevant, we decided to publish it to disseminate observations and stimulate scientific debate.

If the author is indeed one of our colleagues, we hope for their prompt return to discuss this fascinating and incredible journey into an unknown region.

My name is Ernest Méduse. I am the curator of the Port Chouettos Natural History Museum and an explorer.

By the time you read this journal, I will likely no longer be alive. My destiny and curiosity have led me beyond known charts to mysterious waters. A journey of no return.

In these pages, I share with you my discoveries, seen through the eyes of a scientist. Know that all these observations, even the most improbable, are true. Many are beyond my expertise, but I wished to understand and give meaning to this magical place.

Stay curious and open to the wonders around you!

Prof. Ernest Méduse

May 15th 1759.

After many days navigating though storms and untamed waves, I finally found peace on a calm sea. My ship experiences serious damage but I am alive!

The crew abandoned me a long time ago. Terrified by the strange phenomena we encountered, these cowards fled with the rowboats. I thought seamen of the Navy were braver, and they do not merit their high commendations.

It is true that crossing this red fog was an ordeal... The entire hull creaked, its wood seemed to dissolve before my eyes and water seeped through every space. Even my dreams were more vivid, haunted by memories I'd rather have forgotten.

Now alone aboard the *Méduse Infinie*, I reflect upon the events that drove me here. Will curiosity be my downfall? I followed instructions from strange people, whose gilded clothes seem to stick to their own skin. Even though I heard them from a neighbour table, their motives were plain: they were obsessed with gold and driven by a need to find more. Pathetic.

A region lost in the Caribbean... How cannot one be curious?

The first map I obtained, unveiling my path to Sea of Thieves and my destiny.

May 18th 1759.

I finally dropped anchor in a small and quiet bay. I am not surprised to find islands here, but all feels ... unreal.

During my various trips around the world, I collected specimens to increase my knowledge. But I do not really recognize anything in this strange land. I am focused on repairing my ship, but I cannot wait to go explore every centimetre of the coasts and to learn their secrets.

May 20th 1759.

I am now ready, the ship is fixed! With the fish I hunted yesterday, I should be OK for some time. It is time to set sail.

I will let the wind guide me, and finally explore a world that calls me.

June 17th 1759.

Nearly a month since my arrival here and as I expected, I am not alone on these shores. Many pirates are active, sinking their rivals and exchanging amazing treasures to Societies regrouped in small insular settlements. Nothing seem to scare them, not even death.

However, I am surprised - and a little disappointed - to find that gold is their only objective. More gold, always gold! Can this region, named Sea of Thieves, create an obsession in the mind of its inhabitants? Will I also be subject to such an effect?

November 14th 1759.

I visited so many islands here! What a joy to lost myself in palm forests and to dive from cliffs. Every time, my eyes land on something new and I write down every observation.

I imagine myself back to the University, sharing those findings to my amazed colleagues. This journey, fuelled by sheer intellectual curiosity, has turned into a path to eternal glory. And I plan to enjoy every part of it!

... But will this day come? Will I see again the coasts of Port Chouettos? I will write down all my discoveries in this journal hoping to, one day, make them useful to science.

I/ WINDS AND WEATHER

Wind. A natural phenomenon vital for navigation and the individuals living on earth.

In Sea of Thieves, I observed a similar weather system as in our world. Tropical heat due to solar energy at low latitude warms ecosystems and forces water to evaporate to create clouds, from where it rains down back on islands and the ocean.

And of course, wind blows in the atmosphere. It finds its source in the energy excess provoked by a non-uniform sun irradiance at the Earth's surface (more at the Equator than the Poles), and the planet rotation. Nature does not like imbalances, and wind will thus transfer the excess of energy to places that have less.

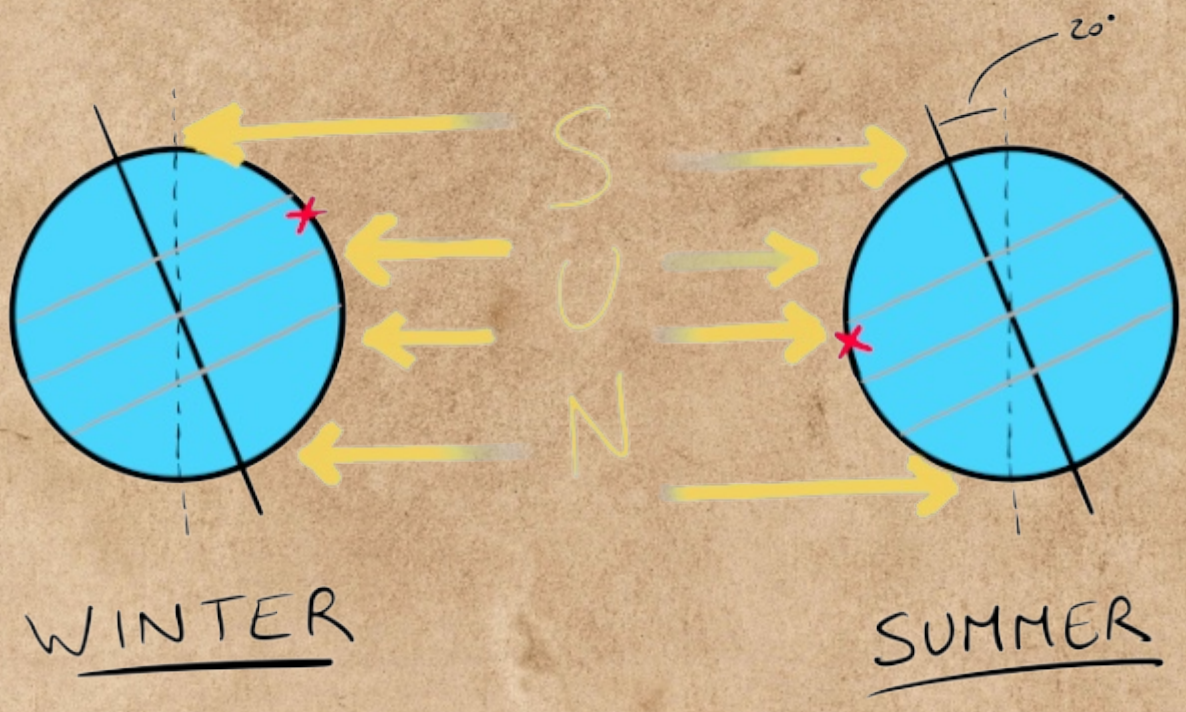


Illustration of the solar energy received at the surface, in regards to latitude and seasonality. The longer the yellow arrow, the higher the received energy. The red cross indicates the location of Sea of Thieves and the solid black line is the Earth's rotation axis.

Because of the region's localization, I expect a high influence of **trade winds**. These are winds that blow mainly to the west or northwest in the Hadley cell of the northern hemisphere.

> *Cold and dry winds of the high atmosphere are pushed towards the surface at the Tropic of Cancer, where they will blow to the south and increase their temperature and humidity in contact of the ocean. This will make them less dense, so that they will rise at the Equator to reach back high altitude and circulate north to close the loop. Winds are subject to the Coriolis effect, a change of direction due to Earth's rotation. This phenomenon will change their course to the right in the northern hemisphere, explaining their westward deviation instead of only south.*

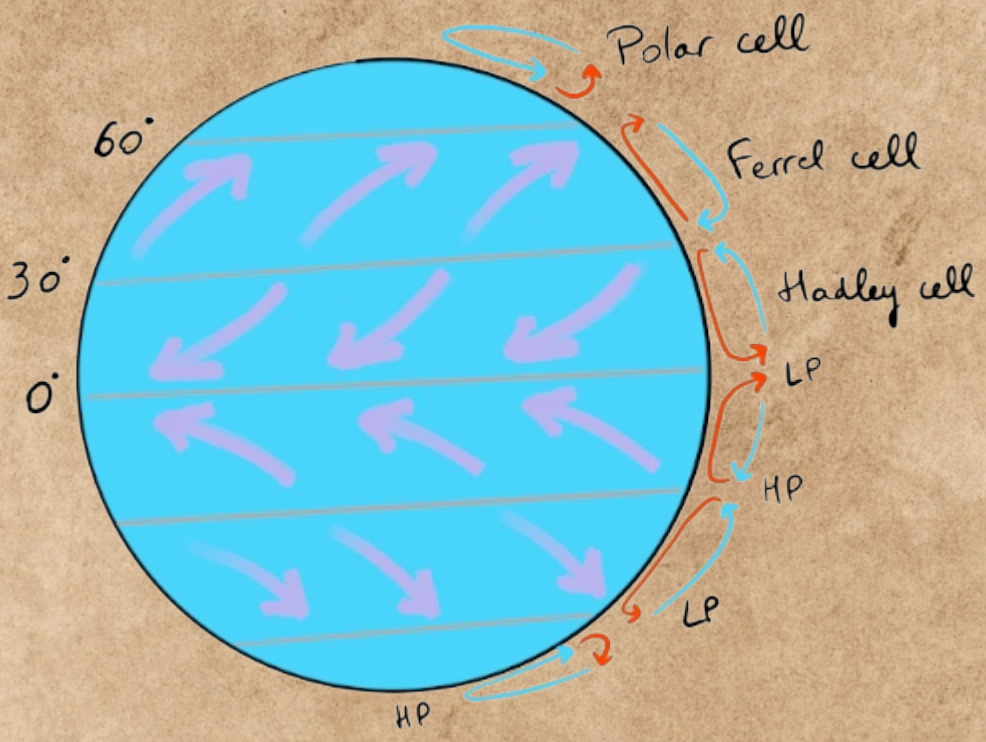


Illustration of the direction of surface dominant winds (purple) and in the different atmospheric cells (HP = high pressure, LP = low pressure).

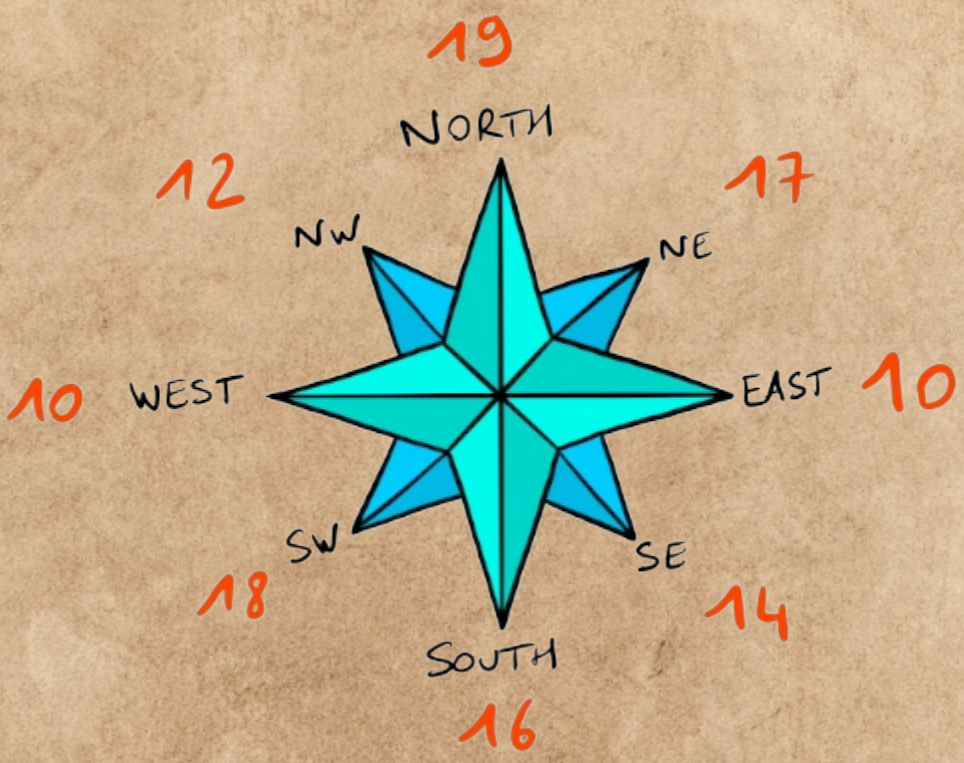
Consequently, I should experience trade winds during my journeys, with a global southwest flow.

To be certain, I decided to make some surveys in various places of the region to answer three questions:

- Does the wind have a main direction?
- What is its local dynamics?
- Does it blows uniformly on all the region?

For the first question, my protocol is quite simple: I just need to position myself at a place, write down the wind direction every five hours and repeat the experience several times to calculate an average direction. I will also collect time, date and coordinates of the observations, to test if these parameters might influence conclusions.

Day	Hour	Place	Direction	Day	Hour	Place	Direction
5	14	D10	**N**	2	21	O1	**SW**
5	19	D10	**E**	3	2	I1	**SW**
1	12	J18	**NW**	3	7	B1	**S**
1	5	J18	**NW**	3	12	D1	**SW**
1	10	J18	**N**	3	17	I1	**SW**
1	15	J18	**NE**	3	22	O1	**W**
1	20	J18	**E**	4	3	S1	**SW**
2	1	J18	**NE**	12	9	T2	**SW**
2	6	J18	**E**	12	14	T9	**W**
1	11	J18	**N**	12	19	T14	**N**
1	16	J18	**NE**	13	0	T20	**NE**
1	21	J18	**N**	13	5	T25	**N**
2	2	J18	**W**	11	8	T26	**SW**
2	7	J18	**SW**	11	13	T21	**S**
7	2	R24	**S**	11	18	T16	**S**
7	2	A16	**SE**	11	23	T11	**W**
7	2	J1	**S**	12	4	T5	**S**
7	7	R24	**E**	6	19	A26	**SE**
7	7	A16	**E**	7	0	A20	**E**
7	7	J1	**E**	7	5	A15	**SE**
7	12	R24	**SE**	7	10	A9	**S**
7	12	A16	**SE**	7	15	A4	**SE**
7	12	J1	**SE**	7	20	A3	**S**
7	17	R24	**S**	8	1	A9	**SE**
7	17	A16	**S**	8	6	A17	**SW**
7	17	J1	**S**	8	11	A24	**S**
7	22	R24	**SW**	18	23	R8	**NE**
7	22	A16	**SW**	19	3	R8	**SE**
7	22	J1	**SW**	19	8	R8	**NE**
21	11	J18	**SW**	19	13	R8	**NW**
21	15	J18	**W**	19	18	R8	**N**
25	22	Q17	**SW**	19	23	R8	**NE**
26	3	Q17	**S**	20	4	J18	**NW**
26	8	J18	**N**	21	0	I15	**W**
26	13	R8	**S**	21	5	G10	**SW**
27	9	J18	**NW**	21	10	D7	**SW**
27	9	J18	**NE**	21	15	D7	**S**
27	14	J18	**N**	3	10	Q17	**E**
27	14	J18	**NE**	3	15	Q17	**N**
27	19	J18	**N**	3	20	Q17	**N**
27	19	J18	**NE**	4	1	Q17	**N**
22	20	B23	**NE**	4	6	Q17	**NW**
23	1	A23	**SE**	4	11	Q17	**W**
23	6	E23	**SE**	4	16	D10	**SE**
23	11	L23	**NE**	4	22	D10	**NE**
23	16	S23	**N**	5	3	D10	**N**
24	7	Y24	**W**	3	6	M8	**NW**
24	12	S24	**SW**	3	11	M8	**W**
24	17	M24	**S**	3	16	M8	**N**
24	22	I24	**NE**	9	3	D10	**NW**
25	3	E24	**E**	9	12	G9	**NE**
25	8	A24	**NE**	9	15	R8	**N**
30	23	A24	**NW**	9	21	P8	**E**
1	4	G24	**N**	10	4	M13	**SW**
1	9	N24	**N**	10	8	J16	**SE**
1	14	U24	**NW**	11	1	J18	**SW**
1	19	Z24	**W**	11	8	O17	**NW**
2	16	T1	**SE**				



I marked down my results on a wind rose, with the observed frequencies for each cardinal direction (in red).

With more than 100 observations, I cannot really describe a clear dominant direction, even though northeast and southwest are more represented. This is interesting, because even though I expected some **variability** (mainly due to small scale effects such as turbulence), it is clear that trade winds are not the main source of the wind's direction here.

Thus, I made additional calculations to understand if wind direction might be influenced by local parameters such as *position* during sampling, *time* or *date*. Every time, tests were not significant: there is absolutely no effect of these parameters.

And there does not seem to have any link with the presence of local precipitations too.

At this stage, I cannot conclude that the direction of the wind experienced in Sea of Thieves is driven by current meteorological variables. Could the wind blow in a complete random way?

In any case, my results tell me that much...

I seldom noticed that wind did not blow in the same direction between two successive sampling times. To understand variability and answer my second question, I made a new series of high-frequency observations, with only one hour between each samples.

Day	Hour	Place	Direction	Day	Hour	Place	Direction
3	10	Q17	**E**	4	19	D10	**SE**
3	11	Q17	**E**	4	20	D10	**NE**
3	12	Q17	**E**	4	21	D10	**NE**
3	13	Q17	**N**	4	22	D10	**NE**
3	14	Q17	**N**	4	23	D10	**NE**
3	15	Q17	**N**	5	0	D10	**N**
3	16	Q17	**N**	5	1	D10	**N**
3	17	Q17	**N**	5	2	D10	**N**
3	18	Q17	**N**	5	3	D10	**N**
3	19	Q17	**N**	5	4	D10	**NW**
3	20	Q17	**N**	3	3	M8	**N**
3	21	Q17	**NE**	3	4	M8	**N**
3	22	Q17	**NE**	3	5	M8	**N**
3	23	Q17	**NE**	3	6	M8	**NW**
4	0	Q17	**N**	3	7	M8	**NW**
4	1	Q17	**N**	3	8	M8	**NW**
4	2	Q17	**N**	3	9	M8	**NW**
4	3	Q17	**N**	3	10	M8	**W**
4	4	Q17	**N**	3	11	M8	**W**
4	5	Q17	**NW**	3	12	M8	**W**
4	6	Q17	**NW**	3	13	M8	**N**
4	7	Q17	**NW**	3	14	M8	**N**
4	8	Q17	**NW**	3	15	M8	**N**
4	9	Q17	**NW**	3	16	M8	**N**
4	10	Q17	**W**	3	17	M8	**N**
4	11	Q17	**W**	3	18	M8	**NE**
4	12	Q17	**W**	3	19	M8	**NE**
4	13	Q17	**W**	3	20	M8	**NE**
4	16	D10	**E**	3	21	M8	**NE**
4	17	D10	**SE**	3	22	M8	**E**
4	18	D10	**SE**				

Using this table, I discovered that the wind maintains its direction for at least 3 hours at a certain place. This isn't always the case, but this seems to be the shortest observed time before a change. This seems consistent with the results in my first table, where two successive observations never had the same direction (because they were separated by 5 hours).

Another interesting finding: when the wind changes direction, it seems to shift at an angle of 45 to 90 degrees to the left or right of its initial direction. My observations indicate that it is extremely rare for the wind to reverse completely (for example, suddenly going from north to south). This is crucial information for any seafarer!

Finally, to answer my last question, I had to recruit observers in various locations throughout Sea of Thieves. I asked trusted sailors to position themselves in each region:

- R8 for the Wilds
- F7 for the Shores of Plenty
- J18 for the Ancient Isles
- V17 for the Devil's Roar

Starting at a pre-determined time and day, each sailor took six observations spaced 5 hours apart. Each time, the answer was clear: wind direction was the same. The wind therefore blows in a single direction across the entire Sea of Thieves. This is a surprising discovery for such a vast area...

II/ CURRENTS AND WATER MASSES

For several weeks now, I've been traveling this region in search of its secrets. My thirst for science has driven me to discover wild islands, dive along the coasts, and meet colourful pirates. Magic infuses every place I visit, and I've even had to defend myself against terrifying undead skeletons...

Every day, my knowledge of Sea of Thieves grows. The map I've drawn is beginning to take shape, and I'm not surprised to see that this world is mostly oceanic: with islands scattered across a vast expanse of marine water. To optimize my travels and better understand these ecosystems, I obviously need to take an interest in ocean currents.

Just as wind moves energy through the atmosphere, currents transport masses of water from one place to another based on their characteristics. Generally, the main force driving currents is density. This property is important in oceanography because water masses of different densities cannot easily mix, creating physical barriers between them.

Density is calculated based on temperature and salinity, so each ocean and sea on the globe will have specific properties. Furthermore, density will not be identical from the surface to the bottom, where several 'layers' of water may overlap without mixing.

The atmosphere and the ocean are two fluids, and exchanges will take place when they come into contact. Climate will modify the density of the water (warming, dilution, etc.) and wind will 'push' the surface layers to create surface currents.

Wind effect on the surface will also be experienced at a certain depth, due to a transfer of energy from one layer of water to another (successive blue arrows below) until it is completely dissipated. However, as with the wind, direction of the current will change due to the Coriolis effect. If we sum up the average current across the entire layer of water influenced by the wind (red arrow below), its direction will be 90 degrees to the right in the northern hemisphere or to the left in the southern hemisphere. This phenomenon is called Ekman transport.

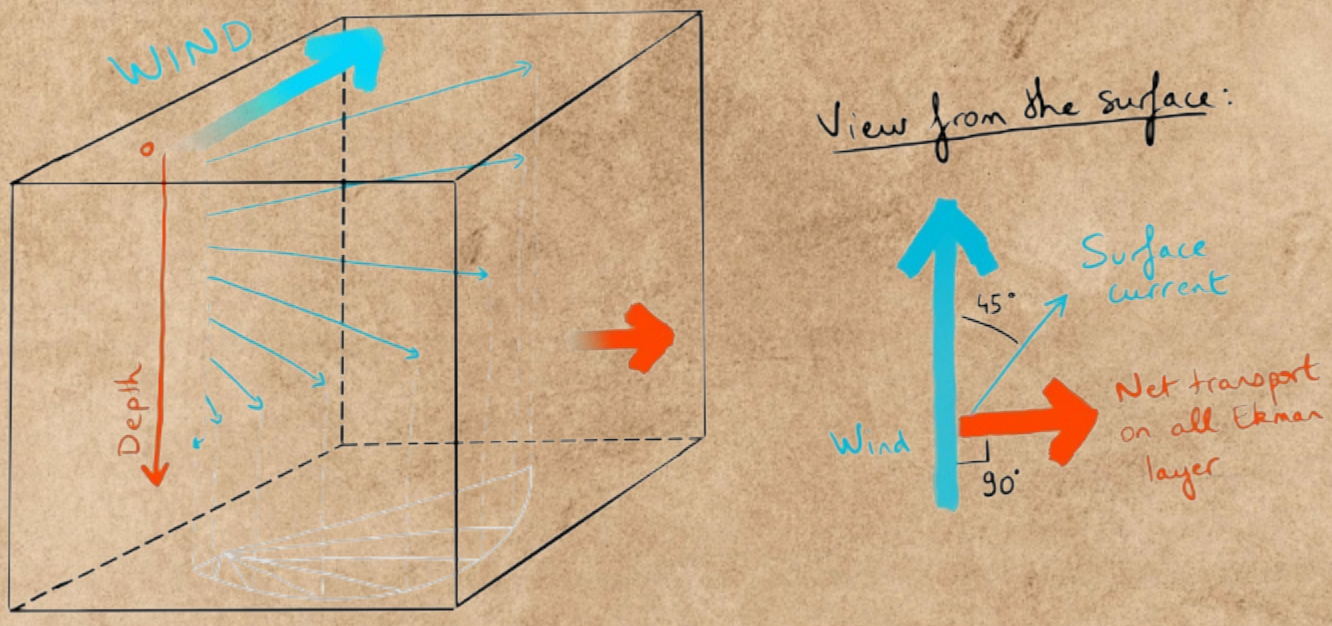
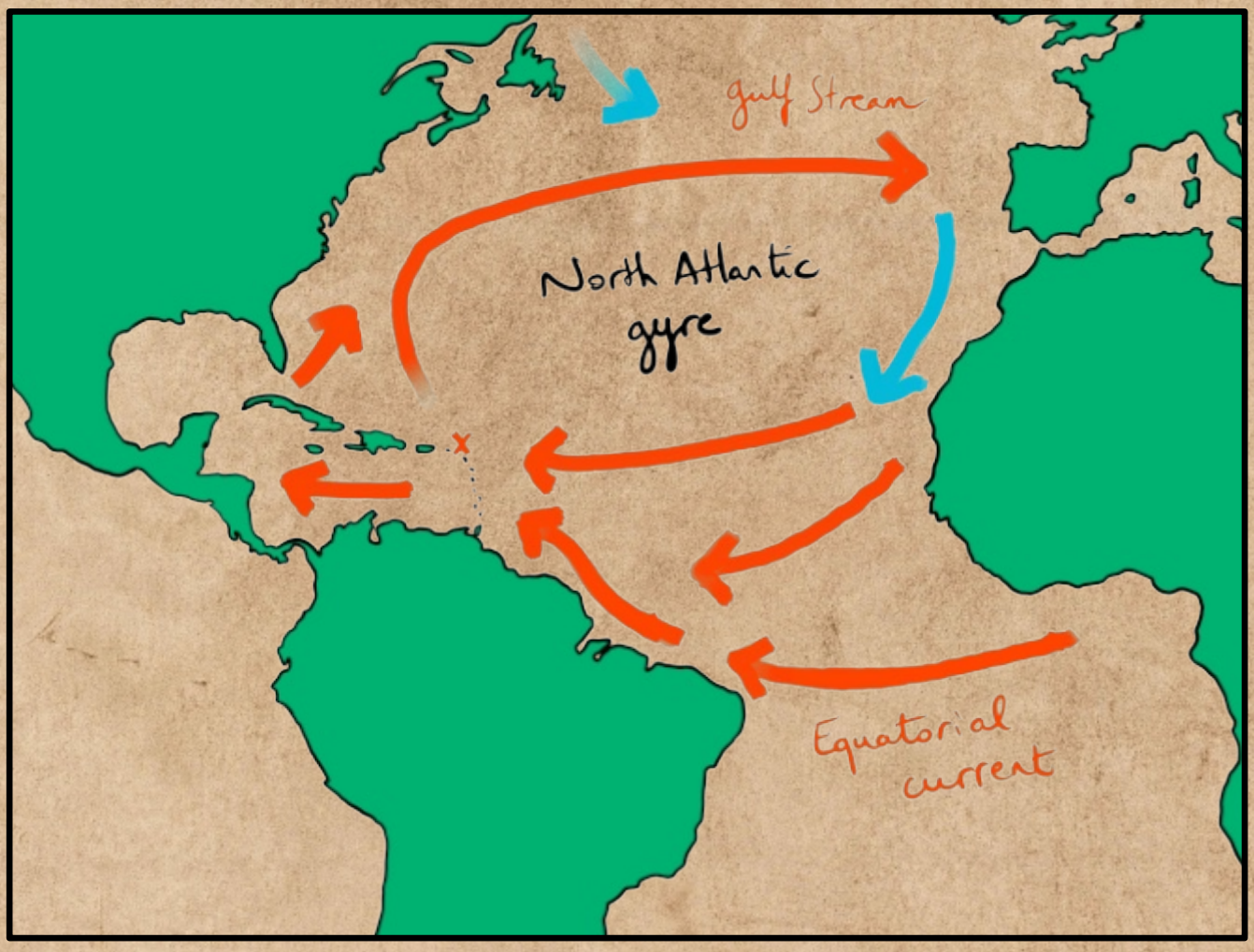


Illustration of Ekman transport in a water volume influenced by surface winds (blue arrow). Grey lines represents currents direction projected on a flat surface to show how they change with depth.

In the Caribbean Sea, surface water comes mainly from two sources:

- The warm, salty North Equatorial Current from the North Atlantic Gyre, moving westward
- The warm, slightly salty Guiana Current, originating from the Equatorial Current and moving from south to north along the Caribbean islands

So I'm not surprised to see warm, moderately saline waters in Sea of Thieves, resulting from freshwater inputs (nearby rivers and rainfall) and strong sunlight.



Map of surface currents in the North Atlantic (red = warm currents, blue = cold currents).

Regarding the direction of surface currents, wherever I am, I have always observed a movement of water toward the southeast. The direction of the waves, as well as the behaviour of my ship, which is always deflected in that direction, make me confident for this result.

I honestly expected to observe a northwesterly current! After all, this region is close to the Gulf Stream, an important current for the Atlantic circulation, which moves the waters mostly in that direction.

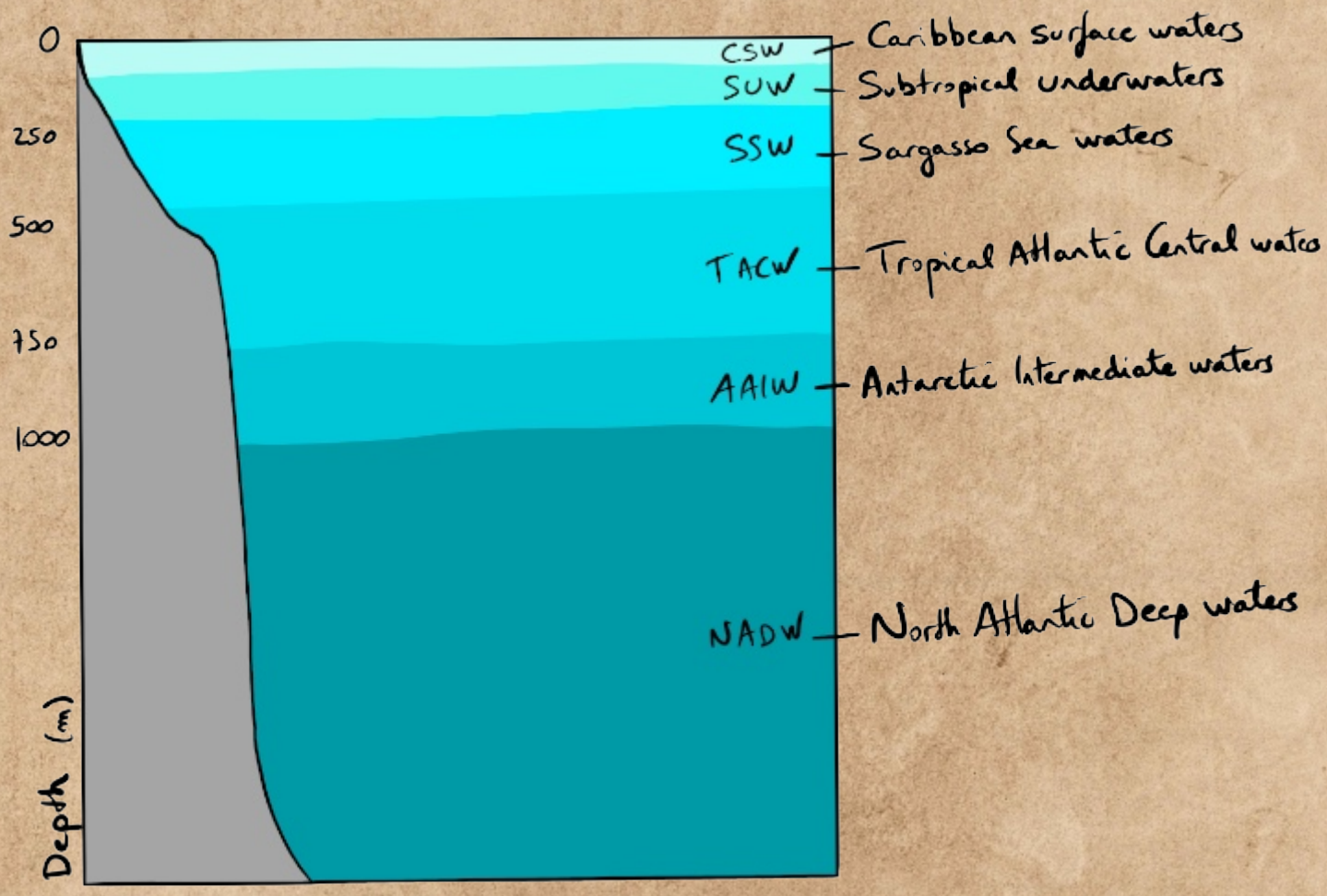
If wind was the main driver of the currents I experience, then it would take a northeasterly wind to create a southeasterly ocean current (see above). This conflicts with the highly variable results I have obtained previously, which leads me to suspect the influence of other mechanisms at the regional level.

Perhaps the Devil's Shroud (the fog that surrounds and isolates Sea of Thieves) is the key to this enigma?

The geographical location of Sea of Thieves suggests that the depth of the water column can quickly reach up to 2,000 m. If I rely on the studies published by my esteemed colleagues, several major water masses follow one another according to depth and density (from the least dense at the surface to the most dense at the bottom):

- Subtropical Underwater, warm and very saline
- Sargasso Sea Water, warm and saline, formed in the North Atlantic Subtropical Gyre
- Tropical Atlantic Central Water, relatively warm and saline, produced at subtropical latitudes
- Antarctic Intermediate Water, cold and slightly saline, created along Antarctica and flowing north
- North Atlantic Deep Water, cold and slightly saline, created near Greenland, which covers the seafloor and moves south

It's difficult to identify trends without data. As it stands, I can only make assumptions that would need to be tested using thermometers, deep-sea sampling bottles, and drifting buoys. It's frustrating not to have brought my entire laboratory on board! I would have loved to test these assumptions and understand the variability of water masses in Sea of Thieves.



Vertical profile of water masses along the Caribbean islands, in regards of depth. Each water mass has been created in specific places and flow in the oceans relative to their density (the higher the density, the lower the water mass sinks).

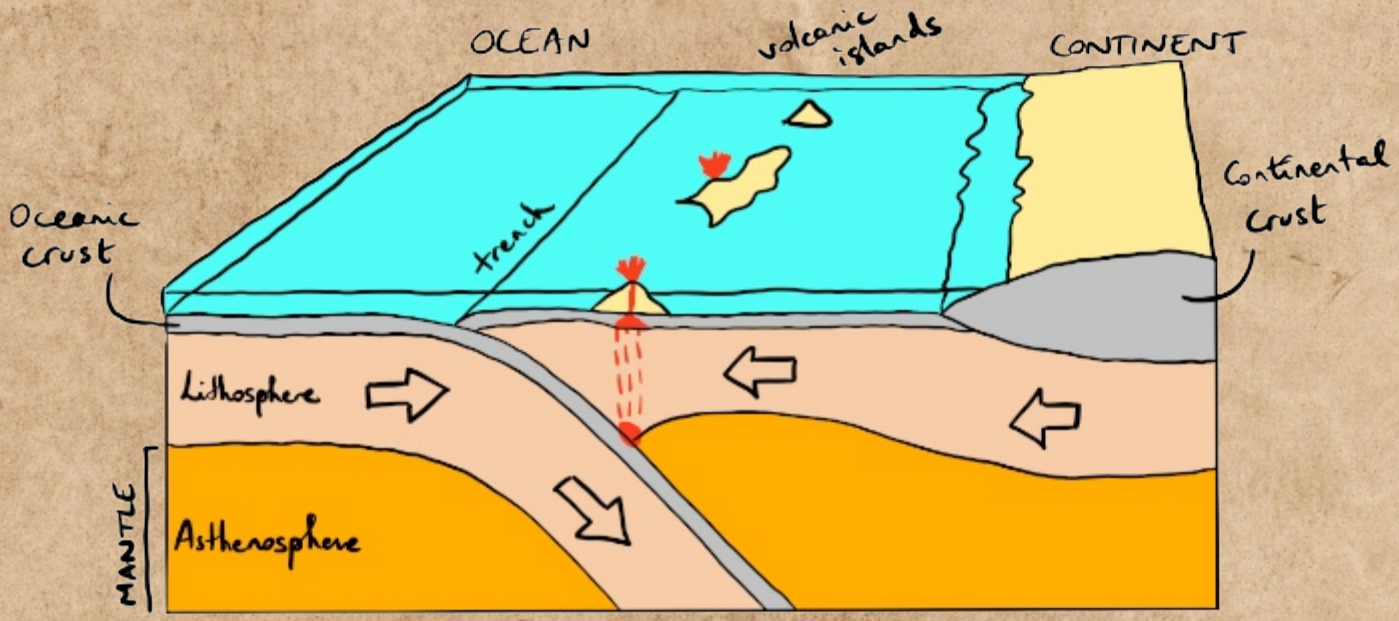
III/ GEOLOGY

As I planned this expedition, I accepted that I would have many unanswered questions. How was this world created? Why have we only discovered it now? Where does its magic come from? Even though I've prepared as much as possible, I'll have to be smart to apply a rigorous approach and understand this world.

Let's talk about the islands, for example. More than fifty are scattered across four regions with very different components. Sea of Thieves is located North of the Caribbean tectonic plate, close to the North American plate. When two plates meet, several phenomena can occur, particularly **subduction** (the submersion of one plate under the other).

> *Tectonic plates are pieces of the planet's surface, on which continents and oceans are located. They were created by the Earth's internal activity, where movements of magma and differences in geological composition cause fractures in a part of the Earth's crust (the lithosphere). These plates will move relative to each other, and their interactions will lead to major events, particularly at their meeting points.*

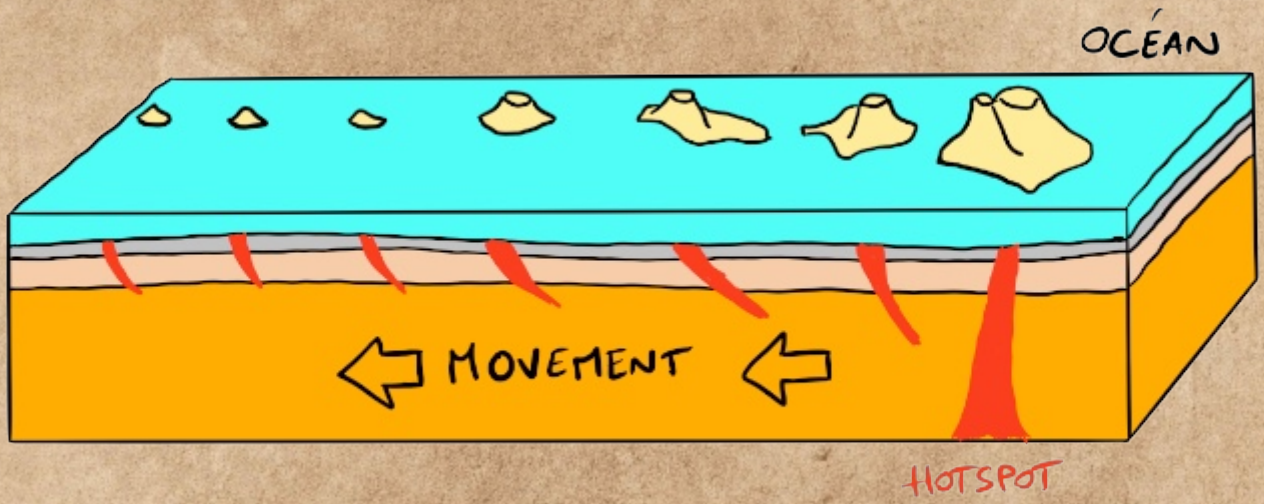
When subduction occurs, friction between the two plates can cause changes in the structure of the Earth's crust, seismic activity and a rise of volcanic magma to the surface.



This is one of the hypotheses put forward for the creation of the Caribbean islands, which form an arc along the subduction zone where basalt rocks are deposited following volcanic activity. On the other hand, the accumulation of limestone material following the establishment of corals can also lead to the creation of islands. This latter case is found, for example, in the Bahamas.

After numerous visits to the region's islands, I observed impressive rock formations whose composition resembles **basalts**. Very few limestone blocks seem to support the formation of islands, even though several coral reefs are present, particularly in the Shores of Plenty. More than a dozen volcanoes are still active in the Devil's Roar, the easternmost region, which seems to confirm this hypothesis.

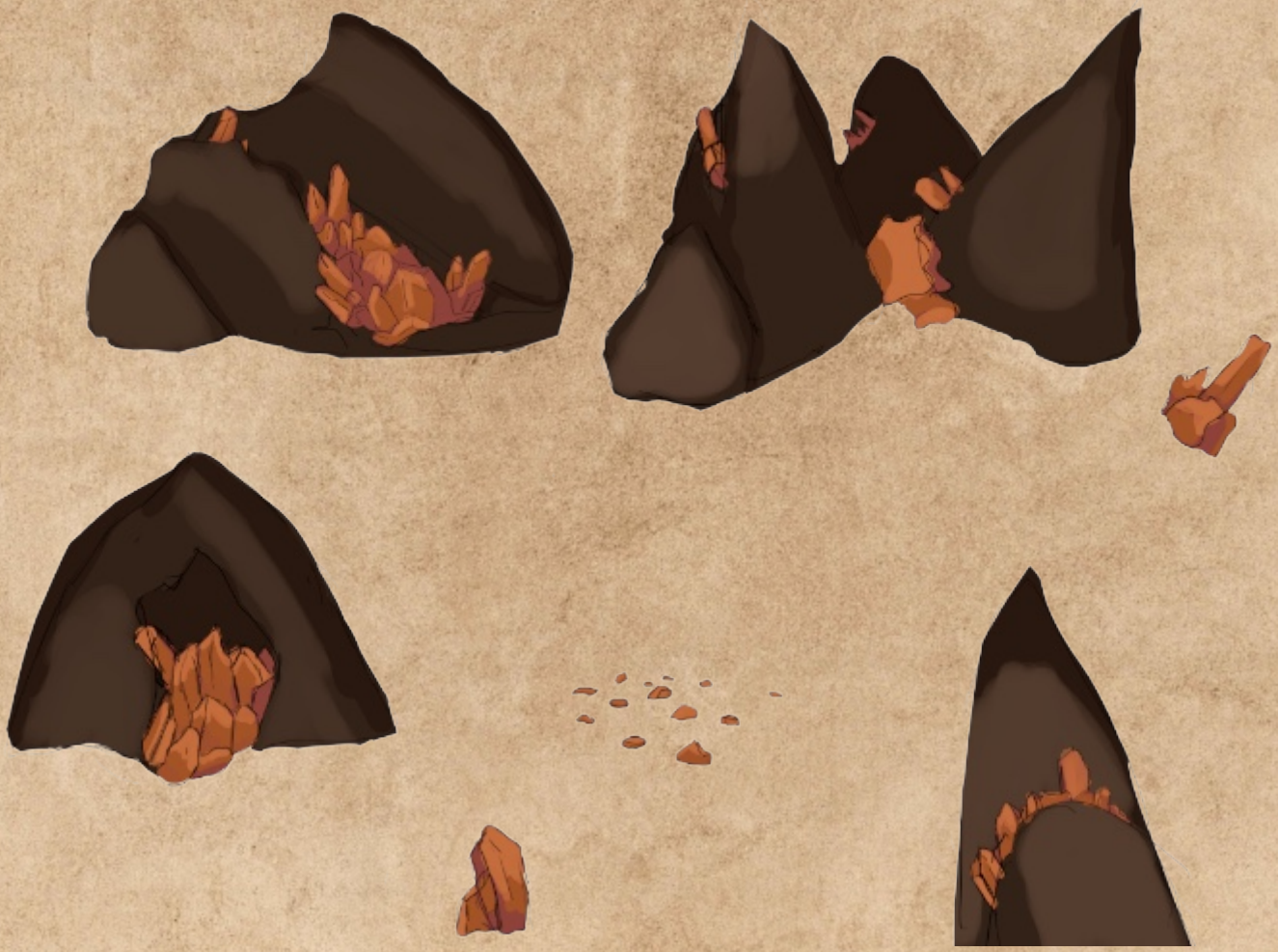
Another hypothesis to explain the region's geology could be the presence of a type of volcanism that is not directly linked to the tectonic plates. This one, called 'hotspot', results from activity in the deep layers of the mantle, the material of which rises to the surface. Movement of the upper plates will create a series of islands in the direction of movement.



After some thought, I think that this last scenario is not the most likely one because the Caribbean plate is moving from west to east. If the islands were formed by hotspot volcanism, this would imply that the active zone is located in the west and that the eastern islands are inert (because they are moving away from the deep fixed volcano). Which is not the case! The hypothesis of the volcanic arc created in a subduction zone therefore seems more logical to me.

Regarding the rocks in Sea of Thieves, I don't think I can describe them any further than the above without a microscope or a laboratory. The only observation I'm certain of is the presence of bright red crystals in the Devil's Roar. They emit a strange energy and seem to generate their own heat.

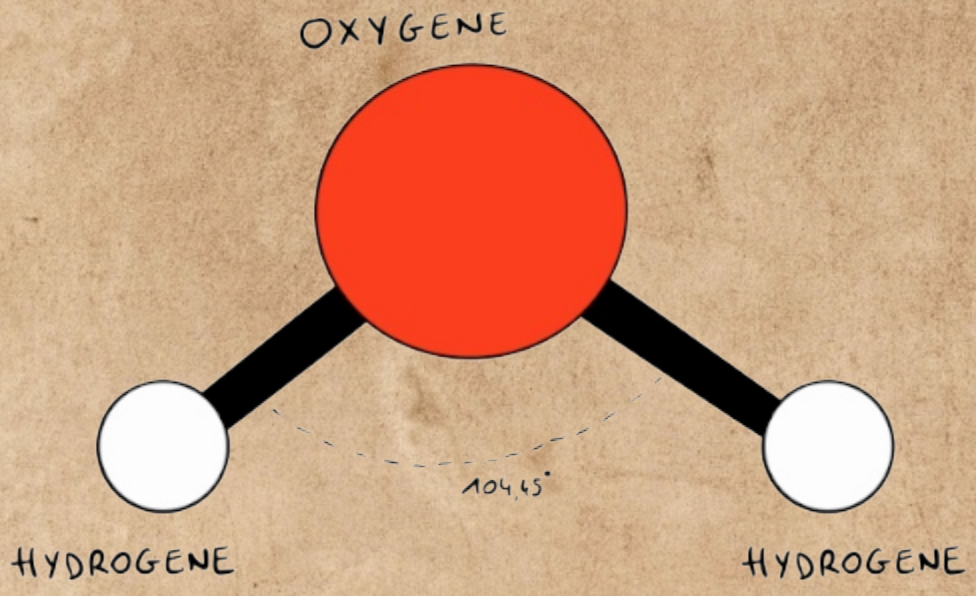
These gems are found in the rock itself or on the shoreline, polished by the waves. They very closely resemble sunstone, a precious crystal composed of silicates. But I've never heard of any deposits in the Caribbean. I'll be sure to bring some samples to my jeweller friends... if I don't burn myself while collecting them.



IV/ WATER CHEMISTRY

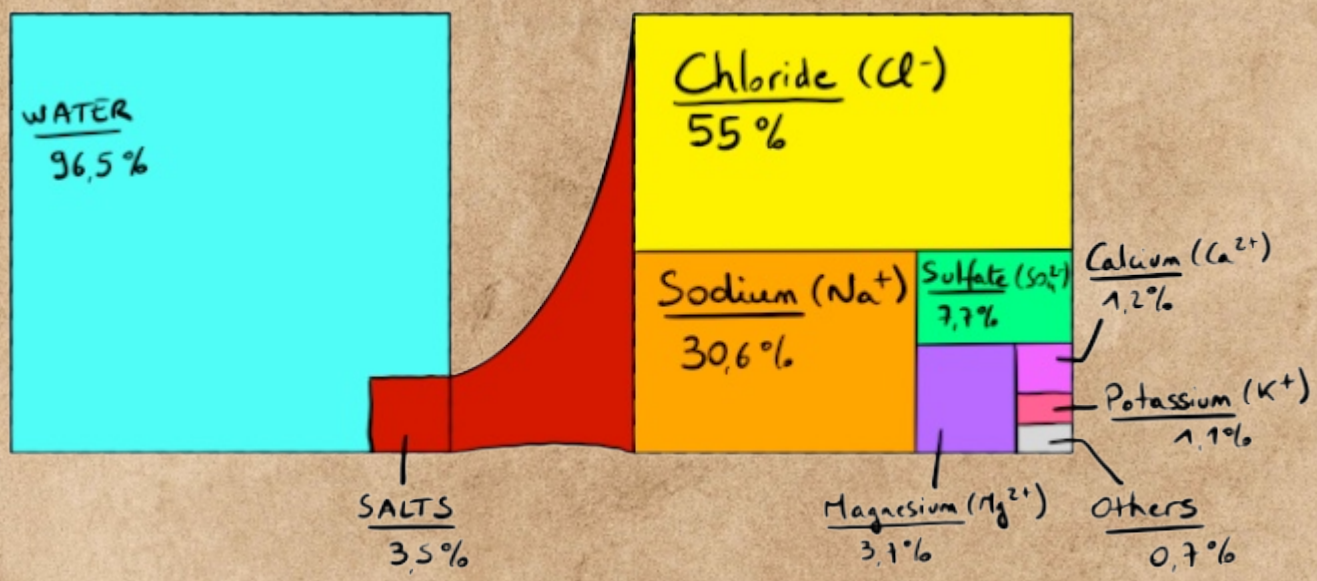
I've always lived close to the ocean. In my youth, I used to run along the beaches of Port Chouettos and spend my evenings near the harbour watching the ships busy themselves. For as long as I can remember, I've been fascinated by this blue infinity, a companion of our civilization but also mysterious and dangerous. It was only later that I found the tools to investigate and understand this strange environment.

The ocean is, above all, water, a molecule composed of three atoms: one oxygen and two hydrogen. Millions of billions of water molecules make up the world's oceans, providing an environment favourable for numerous chemical reactions. Water is not an inert molecule: it is polar, meaning it has a positive and a negative pole. This is due to the angle between the three water atoms, which produces an excess of negative charges (electrons) close to the oxygene.



This 'magnet' effect creates bonds between water molecules, where hydrogen atoms are attracted to the oxygen in nearby molecules to form a network of interactions. Water is thus a solvent and will have the power to break down many molecules into smaller elements.

Some elements will be **dissolved**, that is to say distributed homogeneously in the solution and in direct connection with the water molecules. This is the case, for example, of ions, charged elements which can easily interact with water. The presence of ions defines the notion of salinity of the ocean (which gives the salty taste) but their concentration, that is to say a mass of ion in a volume of water, is not identical and will depend on many factors. Note that the relative proportions of the major ions remain constant thanks to a homogeneous mixture on a global scale:



Salinity is expressed without units (or in ‰), because it is a quantity of salt in a quantity of water. For the oceans, its value varies between 34 and 38 depending on the location, the input of freshwater (which will dilute the ions) and the effect of heat (which will concentrate them).

However, I'm going to have a problem measuring this parameter in the waters of Sea of Thieves, as I need equipment that's unobtainable here. I did ask the Outpost merchants for a simple scale, but they don't seem to have brought one with them...

Based on my knowledge of the region, which is very warm and influenced by the Atlantic waters, I expect relative saline waters. Probably between 35 and 36, but I won't be able to find out more. Does it vary from one region to another? It's likely that the waters in the Devil's Roar are more saline than elsewhere, because they are warmer and don't receive precipitation, but that's the only hypothesis I can put forward.

But there are not only ions dissolved in water. Other molecules cannot dissolve completely due to their size or chemical composition and thus remain **in suspension**. There are two main types:

- Biological: animal remains, bacteria, debris formed during the life of species, etc.
- Mineral: terrestrial inputs, exchanges with sediment, geological activity, etc.

These particles, which originate mainly from surface and coastal areas, will group together to form small clumps that fall to the ocean floor by gravity. This phenomenon is nicely referred to as marine snow.

Generally speaking, suspended matter is closely related to water colour. The more there is, the less clear the water will be because these particles absorb sunlight and reflect it in all directions. Several instruments can be used to estimate turbidity (in other words, the opacity of the water), but this will be largely unnecessary here, as the waters of Sea of Thieves are crystal clear.

Especially in the Shores of Plenty and the Ancient Isles, where underwater visibility is impressive, I suspect very little suspended matter is present. In the case of the Wilds, the water is murkier, but the islands aren't that different from elsewhere. I hypothesize that the currents may be more powerful and cause significant mixing of the seabed, carrying sediment with them. Finally, for the case of the Devil's Roar, seismic activity and the enormous boulders spewed out by volcanoes certainly have an impact.

Another important component, and not the least, is the presence of **dissolved gases** in the water. Indeed, the ocean is in direct contact with the atmosphere, and gases present there will have to balance their concentrations in these two compartments. There will therefore be mainly dissolution from the atmosphere to the ocean, but this is not always the case and the latter can also emit under certain conditions.

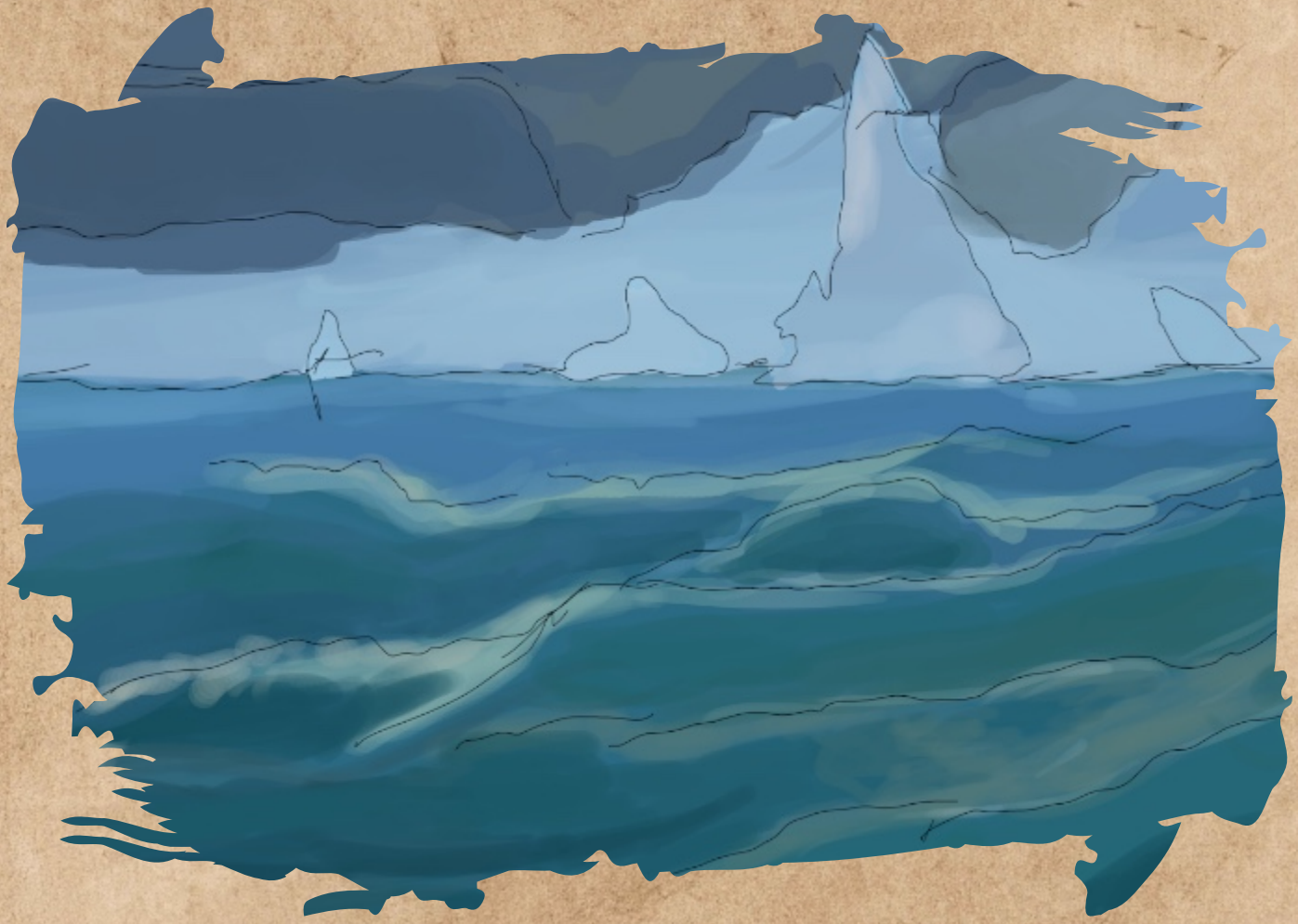
> *This is a matter of partial pressure, a physicochemical variable related to the state of a gas in its environment. The higher this pressure, the greater its solubility in water.*

This is why the ocean contains a certain concentration of all the gases present in the atmosphere in dissolved form, particularly oxygen O_2, carbon dioxide CO_2 and nitrogen N_2. Their concentration will vary with depth, particularly because they are involved in various chemical reactions (and used by marine species). Obviously, it is unthinkable to measure dissolved gas concentrations with my current equipment.

However, during my dives, I discovered a strange phenomenon. I was aware of the existence of 'black smokers', abyssal vents that release a cocktail of molecules resulting from the planet's seismic activity. But I had never heard of air smokers! Yet that's what I found, near towering rock formations, where concretions release an abundant source of air bubbles.

This discovery is absolutely revolutionary. Some gases can be produced by biology or other processes (such as the electrolysis of water molecules to produce O_2 near rocks rich in conductive materials). But to produce a gas directly breathable by humans, with the same mixture as in the atmosphere... that's incredible.

The last observation I will make regarding the water chemistry of Sea of Thieves is related to the influence of a permanent storm. This storm moves along a defined trajectory (Ancient Isles University, 1855) and brings significant quantities of fresh water. The presence of this phenomenon confirms the presence of a water cycle similar to that of the world I know.



V/ BIOLOGY

If there's one thing that's certain in this mysterious world, it's that it is teeming with life. Whether on land or at sea, flora and fauna are everywhere, creating a paradise-like universe. Discovering their way of life and studying their environment was a pleasure for me, even if I almost had my legs bitten off more than once.

To understand how these environments are structured, it's important to know what a **trophic network** is. Simply put, this term refers to the 'who eats whom?' relationships, which are more than just a chain (prey don't have just one predator, and vice versa). It's a flow of energy within the ecosystem, a vital resource for enabling biological activity at the individual (metabolism) and community (interspecies relationships) levels.

Basically, energy comes from inorganic sources, such as the sun, which are used by organisms adapted to benefit from it. In particular, photosynthesis in plant species uses solar energy and inorganic compounds to build molecules essential to life. These species are called primary producers (mineral energy => chemical energy), and include a wide variety of plants, algae and bacteria.

Subsequently, a number of species evolved to gain their energy by hunting prey. These species are thus secondary producers (chemical energy => chemical energy): herbivores if they consume plant species or carnivores if their preys are other animals.

To this description, we must add organisms that decompose organic matter once it has died. These ‘recyclers’ play a crucial role in remineralizing matter and making it available again for primary producers, thus avoiding depletion of stocks. Furthermore, suspended organic matter created by the activity of decomposers is a food source for certain species, which obtain it by filtering water or ingesting sediment.

Now, what about the species found in Sea of Thieves?

1. Flora

On land first, I was able to observe a relatively low diversity of plants. There are no agricultural areas on Sea of Thieves, suggesting that these plants are endemic (i.e., native to the region). A few species are different between the four regions, but I identified between 5 and 10 per island.

The most common is a species of twisted palm, probably from the Arecaceae family. Several genera, such as *Acrocomia*, *Coccothrinax*, *Roystonea*, and *Sabal*, are found in the Virgin Islands, and it is very likely that the palms that live here are their cousins. Deciduous trees are also present, although relatively rare. I have mostly observed them high up on hills, assuming they are less tolerant of salt in the soil than palms.

> *With limited space and resources, each species will seek to maximize its success by choosing the conditions that are most favourable to it. This is the concept of the ecological niche, where competition between species will force the organization of the ecosystem.*

Several ferns and small, flat-leaved bushes are also notable, in addition to red and white flowers scattered through the grass. This low-lying vegetation, consistent with known inventories of the region, could be the result of wind stress.

Note that the Shores of Plenty and the Ancient Isles appear to have particularly favourable conditions for lush vegetation. The vegetation in the Wilds, on the other hand, is more sparse and less diverse, with many dead trees, suggesting that the soil is poor in nutrients. As for the Devil's Roar, the flora has evolved to support life in volcanic conditions (very nutrient-rich soil and high temperatures). Some species have even developed stunning glowing red spots, as if they were burning...

Underwater, there are two main components to consider: phytoplankton (microscopic algae in the water column) and large plants attached to the shores.

The former is difficult to observe without a microscope, but the generally extremely clear waters of Sea of Thieves lead me to believe it's not very abundant. Note that on a global scale, this compartment produces a huge portion of the oxygen we breathe. In my lab, I've observed incredible species, some of which, diatoms, produce a glass skeleton.

Regarding macro-vegetation, I identified 4 major species, which corresponds to a low diversity for Caribbean islands. The most surprising is a green algae that has a long central stem with numerous thalli on each side (a sort of leaf). I have only observed this type of structure in brown laminarian algae, but these species are not found in tropical waters. It is most certainly a new species, endemic to the region. Many beaches also have underwater meadows, made up of flowering plants and roots (these are not algae!) that cover all the sand. These seagrass beds, probably of the *Thallasia* or *Halophila* genera, are crucial for many species of fish and for stabilizing sand. Finally, two other algae (one green and one red) are present sparsely.

I heard of a group of pirates interested in Botanic, who regrouped their observations in a field catalog. We absolutely need to share our findings together!

2. Fauna

The island vegetation provides an excellent environment for many animals that feed on it and hide there. Among these, I was surprised to encounter many domestic species, whose origins are likely human-introduced.

Several varieties of pigs roam freely alongside wild boars, both likely subspecies of *Sus scrofa*. The only species that resembles these animals and is endemic to Central America would be the peccary (family Tayassuidae), but I haven't encountered any here. I notice the same trend with chickens, *Gallus gallus*, which hunt sandworms and other small insects. They seem to belong to the Araucana variety, which is native to Peru. I also encountered a few snakes, whose venom incapacitated me several times. This time, I am not surprised because many snakes are endemic to the Caribbean even though I have only observed snakes moving on the ground (some boas like the genus *Tropidophis* can be found in trees).

Other small animals can be found for the discerning eye, including small lizards basking in the sun or worms in the sand. And of course, there are also all the insects essential to the functioning of ecosystems (such as pollinating plants), but they are very hard to see. You have to listen carefully to guess their presence!

Common name	Probable / suggested scientific name
Mammals	
Domestic pig	*Sus scrofa domestica*
Boar	*Sus scrofa*
Bat	*Artibeus jamaicensis*
Domestic dog	*Canis familiaris*
Domestic cat	*Felis catus*
Domestic monkey	*Pan troglodytes*
Rat	*Rattus norvegicus*
Birds	
Domestic chicken	*Gallus gallus*
Gull	*Larus elegans*
Owl	*Athene gwelae*
Toucan	*Ramphastos chroma*
Parrot	*Ara largiloquus*
Reptiles	
Land snake	*Bothrops caribbaeus*
Amphibians	
Lizard	*Pholidoscelis fugitivus*
Worms and insects	
Earth worm	*Lumbricus humus*
Leach	*Hirudinaria arenae*
Grub	*Musca domestica*

Common name	Probable / suggested scientific name
Fishes	
Battlefish	*Synanceia bellum*
Wildsplash	*Sparisoma ferus*
Islehopper	*Diodon insula*
Ancientscale	*Aspidoras viocdora*
Pondie	*Micropterus pacificus*
Plentifin	*Centropyge fraudus*
Wrecker	*Ceratias exulans*
Devilfish	*Pygocentrus marinus*
Splashtail	*Gracila diva*
Stormfish	*Makaira tempestus*
Shark	*Galeocerdo cuvier*
Megalodon	*Otodus megalodon*
Cnidarians	
Blue jellyfish	*Aurelia ernestii*
Flot coral	*Erythropidum gigans*
Luminous coral	*Siderastrea coruscans*
Arthropods	
Red crab	*Ocypode ruber*
Sponges	
Orange sponge	*Agelas calidus*
Molluscs	
Giant clam	*Tridacna insolitus*
Kraken	*Architeuthis kraken*

Regarding the coasts and beaches, several species have been observed throughout the region. As with the plants, there is a wide variety of microscopic animals, grouped together in the zooplankton. It will be difficult for me to describe them here as well, but I expect a low overall presence, mostly composed of copepods (a swimming crustacean).

If you ever visit Sea of Thieves, be warned that the moment you step into the water, you will be attacked by sharks. Sharks are not usually extremely aggressive, but these ones will not hesitate to chase you!

On a more peaceful note, I also observed a wide variety of bony fish (absolutely delicious when cooked). A few species are common along the coasts or in the open ocean, but most are rare and only observed under certain conditions. The only time I saw them in large numbers was in areas near the surface. Large individuals with shimmering colours were present, which suggests that this is a spawning ground where adults come to reproduce. This is a remarkable behaviour shared by all fish species, which can be synchronized with an abundance of food (zooplankton, other fish, etc.).

Among other notable species, I was able to observe impressive coral reefs along the coasts. These havens of biodiversity are based on the symbiosis between two organisms: a cnidarian and a microalgae. Benefiting from each other, they create calcareous structures and serve as habitats for a variety of species. Finally, I also observed terrifying monsters, the sight of which still haunts my nights. Whether it's megalodons, extremely aggressive giant sharks, or the kraken, a colossal octopus, the legends are true...

I will conclude this catalog by mentioning a few animals used as companions by the most ambitious sailors. Some, like parrots, monkeys and toucans, seem endemic, while cats and dogs are clearly imported due to human activities.

VI/ CIVILIZATIONS AND LORE

After several months exploring this land, I'm now convinced that Sea of Thieves has a mysterious past. The ruins I'm discovering seem to belong to an ancient civilization that has completely disappeared. Most of the human structures I've encountered are Outposts, where all activity is focused oceanward, particularly useful for the pirates who inhabit them.

Pirates... This region is full of them, and they seem to be in no short supply. On several occasions, I've crossed paths with them and had to negotiate my way through. A scientist alone on a ship with no treasure or riches isn't a particularly interesting loot, but many pirates are simply looking to cross swords for the sheer pleasure of it. One thing is certain: I'm not the only one to have obtained instructions to reach this pirate paradise.

A real society has been established there over time, where various crews set out in search of exotic treasures and resources to trade with the Trading Companies. At the same time, shops and taverns opened to allow them to spend their gold and enjoy the pleasures of life. It's fascinating to observe how central the pirate life is to this microcosm, completely cut off from the outside world. Now that the so-called 'Golden age of piracy' is over, following the reinforcement of Spanish, English and French forces to drive pirates off their colonies, this generates no fear among the inhabitants of Sea of Thieves, who laugh with a glass of grog in hand and a cutlass at their hip.

This merry atmosphere is contagious!

I also noticed that one of these Outposts, named Port Merrick, had been fortified following an attack by a terrorist group called the Reaper's Bones. Now, this place brings together magnificent buildings as well as a set of public infrastructure: a real city has gathered around the tavern, with a sewer system, a public garden and a lighthouse to facilitate navigation. The densification of the population has required better organization of space, and now maritime jobs are no longer the only career options for the young people who run the streets. It is clear that a civilization step has been taken, and that this seems to be a foretaste of what awaits Sea of Thieves, should a similar trajectory and preserved isolation occur.

I've heard rumours about Athena's Fortune, a mysterious Society said to work to safeguard this world from forces that would enslave it. Its leader, the Pirate Lord Ramsey Singh, retired long ago, but it is rumoured that his work is still felt today. I must admit that none of this has much of an impact on me, as I remain focused on my quest for knowledge. But I've been shocked by some tales shared in taverns, which speak of curses and plots from beyond the grave. Several sources agree, and all are unanimous that this world can 'materialize' memories and emotions.

As if the revived skeletons and sea monsters weren't enough...

According to my information, the 'contemporary' human presence in the region seems relatively recent. Ramsey, the first pirate to set foot on the sands of the Sea of Thieves, is said to have arrived at the beginning of the century, between 1700 and 1710. Logically, ruins and abandoned statues predate this event and clearly indicate that another civilization was present before the pirates. I discussed this subject with Sudds, an old astronomer who lives on an islet near Port Merrick and who seems to know a lot about this.

The Ancients were said to have been a people closely connected to nature and magic. Master navigators and knowledgeable scholars, their civilization transcended the limits of reality by studying dreams, constellations and the secrets of the Sea of the Damned, that strange world that calls the dead back to life. Their disappearance was as sudden as it was complete. Temples that once teemed with life now lie at the bottom of the ocean, and of their sacred sites, only impressive murals remain.

The excavations I've been doing here and there haven't really helped me, although I did stumble upon an underground temple while exploring a fortified area on the Lagoon of Whispers island.

Unfortunately, I was ambushed by obsidian-adorned skeletons before I could fully explore the area. I was able to write down some of the details and elements adorning the statues before battling these terrible foes, but their secrets remain.

It's impossible for me to precisely date the time period in which the Ancients lived, but I can suggest a few hypotheses. One of my colleagues at the University gave a series of lectures on human migrations, described through archaeology. I learned that in the Caribbean, the first human populations settled on the island of Trinidad, from northern Brazil around 9000 BCE. Cuba and the island of Hispaniola were then colonized, followed by several waves of colonization on the rest of the islands between 6000 and 3500 BCE. Obviously, several scenarios can exist, and these movements are far from being completely understood.

If we accept this information as true, then it is possible that the Ancients were descendants of nations established in the region. A few candidates appear credible, including the Taino, Galibi, Kalinago, and Ciboney. How I wish I could meet them to share our knowledge and lift the veil on these mysteries!

Settlement map of the Caribbean Islands, based on archeological surveys (dates and colours). The blue and purple arrows are two independent scenarios proposed to explain population propagation.

March 29th 1762.

I have been exploring Sea of Thieves for several months now, trying to understand how it works and discover its secrets. Even though I am confident in my hypotheses and results, I stay humble for many things will stay unresolved. We will need several generations of scientists and dedicated equipment to go further, and I will surely report this to the faculty's deans once I am back home.

I met fascinating people along my way, and our discussions have been highly illuminating (between two sword fights). I am happy to have taken this daring journey to cross the frontiers of science.

March 30th 1762.

I met a seafarer with the strangest of names, Hendrick. He is a representative for a group of both hunters, targeting mythical monsters, and cooks, feeding Sea of Thieves folks with non-fruit delicacies. A noble cause!

After sharing gilded pork saucisson, we talked about this magical world and his knowledge have been of great assistance to decrypt some observations. He also mentioned a forgotten kingdom at the bottom of the ocean, full of sirens living in gigantic coral palaces. I am not sure to believe in this tall tale, even if I have to admit that my certainties have been shattered many times since my arrival.

May 5th 1762.

Before setting sail back to my home town, I decided to explore the abyssal regions of Sea of Thieves. If what my friend told me is true, there are many discoveries to find for sure and acquired data would be absolutely priceless. But he has also told me of the extreme danger of the place...

In the eventuality that something has happened to me, I give my notes and this journal to Hendrick. They contain my thoughts on this strange world that changed my life, and I wish to share them. His instructions are to send them back to Port Chouettos if I do not reach out before the end of the month.

I feel a strange sensation, like an inexplicable call from the ocean that I cannot ignore. My reason is overwhelmed by curiosity, and I start this new adventure tomorrow...